

# **EXHIBIT A**



# National Toxicology Program

*Good Science for Good Decisions*

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The National Toxicology Program (NTP), within the U.S. Department of Health and Human Services, is an interagency program headquartered at the National Institutes of Health's [National Institute of Environmental Health Sciences](#) (NIEHS) located in Research Triangle Park, NC.

Please send queries, comments, and suggestions to: [ntpwm@niehs.nih.gov](mailto:ntpwm@niehs.nih.gov)

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Last revised: 1 October 2003



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NTP CHEMICAL REPOSITORY  
ETHYLENE GLYCOL

## -IDENTIFIERS

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\*CATALOG ID NUMBER: 000103

\*CAS NUMBER: 107-21-1

\*BASE CHEMICAL NAME: ETHYLENEGLYCOL

\*PRIMARY NAME: ETHYLENE GLYCOL

\*CHEMICAL FORMULA: C2H6O2

\*STRUCTURAL FORMULA: HOCH2CH2OH

\*WLN: Q2Q

## \*SYNONYMS:

ETHANE-1,2-DIOL  
1,2-DIHYDROXYETHANE  
1,2-ETHANDIOL  
1,2-ETHANEDIOL  
ETHYLENE ALCOHOL  
ETHYLENE DIHYDRATE  
GLYCOL  
GLYCOL ALCOHOL  
LUTROL-9  
MACROGOL 400 BPC  
M.E.G.  
MONOETHYLENE GLYCOL  
TESCOL  
NORKOOL  
DOWTHERM SR 1  
UCAR 17  
NCI-C00920

## -PHYSICAL CHEMICAL DATA

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\*PHYSICAL DESCRIPTION: LITERATURE: Clear, colorless, viscous liquid  
REPOSITORY: Clear colorless liquid

\*MOLECULAR WEIGHT: 62.07

\*SPECIFIC GRAVITY: 1.1135 @ 20/4 C [033]

\*DENSITY: 1.1155 g/mL @ 20 C [062]

\*MP (DEG C): -13 C [033,043,205,269]

\*BP (DEG C): 197.6 C [033,071,205]

## \*SOLUBILITIES:

WATER : &gt;=100 mg/mL @ 17.5 C (RAD)

DMSO :  $\geq 100$  mg/mL @ 17.5 C (RAD)

95% ETHANOL :  $\geq 100$  mg/mL @ 17.5 C (RAD)

METHANOL : Soluble [029]

ACETONE :  $\geq 100$  mg/mL @ 17.5 C (RAD)

TOLUENE : Not available

OTHER SOLVENTS:

Alcohol: Soluble [017,062,205]

Lower aliphatic alcohols: Miscible [033,051,430]

Glycerol: Miscible [033,051,205]

Acetic acid: Miscible [029,033,051,205]

Aldehydes: Miscible [033,051,430]

Pyridine and similar coal tar bases: Miscible [029,033,051,205]

Chlorinated hydrocarbons: Practically insoluble [033]

Petroleum ether: Practically insoluble [033]

Carbon tetrachloride: Insoluble [029]

Chloroform: Insoluble [029,205]

Ether: 1 in 200 [033]

Benzene and its homologs: Practically insoluble [033]

Oils: Practically insoluble [033]

Ketones: Miscible [033,051,430]

Carbon disulfide: Insoluble [029]

\*VOLATILITY:

Vapor pressure: 0.06 mm Hg @ 20 C [058,430]; 1 mm Hg @ 53.0 C [038]

Vapor density : 2.14 [043,051,055]

\*FLAMMABILITY (FLASH POINT):

This chemical has a flash point of 111 C (232 F) [043,058,371,451].

It is combustible. Fires involving this material can be controlled with a dry chemical, carbon dioxide or Halon extinguisher. A water spray may also be used [043,058,451]. The autoignition temperature of this compound is 400 C (752 F) [043,051].

\*UEL: Not available

LEL: 3.2% [047,051,058,371]

\*REACTIVITY:

This chemical is incompatible with oxidizers, chromium trioxide, oleum, chlorosulfonic acid, sulfuric acid, HClO<sub>4</sub>, phosphorous pentasulfide, potassium permanganate and sodium peroxide. Mixtures with ammonium dichromate, silver chlorate, sodium chlorite and uranyl nitrate ignite when heated to 100 C. Aqueous solutions may ignite silvered copper wires which have applied D.C. voltage [043].

\*STABILITY:

This chemical is very hygroscopic [033,043,062,275].

\*OTHER PHYSICAL DATA:

Specific gravity: 1.113 @ 25/25 C [043,051,269]; 1.1274 @ 0/4 C [033]

Specific gravity: 1.1065 @ 30/4 C; 1.1204 @ 10/4 C [033]; 1.11 @ 25/4 C [430]

Boiling point: 93 C @ 13 mm Hg [017]; 140 C @ 97 mm Hg; 100 C @ 18 mm Hg [033]

Boiling point: 70 C @ 3.0 mm Hg; 20 C @ 0.06 mm Hg [033]

Vapor pressure: 5 mm Hg @ 79.7 C; 10 mm Hg @ 92.1 C; 20 mm Hg @ 105.8 C [038]

Vapor pressure: 40 mm Hg @ 120 C; 760 mm Hg @ 197.3 C [038]

Odorless [062,346,430]

Viscosity: 26 centipoise @ 15 C; 21 centipoise @ 20 C [033]

Viscosity: 17.3 centipoise @ 25 C [033]  
 Refractive index: 1.43063 @ 25 C; 1.43312 @ 15 C [033]  
 Refractive index: 1.4318 @ 20 C [017,047,205]  
 Sweet taste [029,033,036,062]  
 Dielectric constant: 38.66 esu @ 20 C and 150 m wavelength [033]  
 Dipole moment: 2.20 [033]  
 Specific heat: 0.561 cal/g/C @ 20 C [033]  
 Heat of formation: -108.1 kcal/mol [033]  
 Heat of fusion: 44.7 cal/g [033]  
 Heat of vaporization: 191 cal/g [033]  
 Heat of solution: -6.5 cal/g @ 17 C (when 37 parts are mixed with 63 parts water (w/w)) [033]  
 Surface tension: 48.4 dynes/cm @ 20 C [033]  
 log P octanol: -1.93 [055]  
 Evaporation rate (butyl acetate=1): <0.01 [058]  
 Absorbs twice its weight of water at 100% relative humidity [033]

## -TOXICITY

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\*NIOSH REGISTRY NUMBER: KW2975000

## \*TOXICITY: (abbreviations)

typ.	dose	mode	specie	amount	units	other
TDLo		orl	chd	5500	mg/kg	
LDLo		orl	hmn	786	mg/kg	
TCLo		ihl	hmn	10000	mg/m3	
LDLo		unr	man	1637	mg/kg	
LD50		orl	rat	4700	mg/kg	
LD50		ipr	rat	5010	mg/kg	
LD50		scu	rat	2800	mg/kg	
LD50		ivn	rat	3260	mg/kg	
LDLo		ims	rat	3300	mg/kg	
LD50		orl	mus	7500	mg/kg	
LD50		ipr	mus	5614	mg/kg	
LDLo		scu	mus	2700	mg/kg	
LD50		ivn	mus	3000	mg/kg	
LD50		orl	cat	1650	mg/kg	
LDLo		scu	cat	2000	mg/kg	
LD50		skn	rbt	9530	mg/kg	
LDLo		ipr	rbt	1000	mg/kg	
LDLo		ivn	rbt	5	gm/kg	
LDLo		ims	rbt	5500	mg/kg	
LD50		orl	gpg	6610	mg/kg	
LDLo		scu	gpg	5000	mg/kg	
LDLo		orl	hmn	398	mg/kg	
LD50		orl	dog	5500	mg/kg	

\*AQTX/TLM96: Not available

## \*SAX TOXICITY EVALUATION:

THR: Human poison by ingestion. Moderately toxic to humans by an unspecified route. Moderately toxic experimentally by ingestion, subcutaneous, intravenous and intramuscular routes. Mildly toxic by skin contact.  
 A suspected carcinogen. An experimental teratogen. Human mutagenic data.

## \*CARCINOGENICITY:

Status: NTP Carcinogenesis Studies; on test (two year studies), July 1989

\*MUTATION DATA: See RTECS printout for data

\*TERATOGENICITY: See RTECS printout for data

\*STANDARDS, REGULATIONS & RECOMMENDATIONS:

OSHA: Federal Register (1/19/89)

Final Limit: Ceiling Limit 50 ppm [015,545,610]

ACGIH: Ceiling Limit 50 ppm (vapor) [015,415,421,610]

NIOSH Criteria Document: None

NFPA Hazard Rating: Health (H): 1

Flammability (F): 1

Reactivity (R): 0

H1: Materials only slightly hazardous to health (see NFPA for details).

F1: Materials that must be preheated before ignition can occur (see NFPA for details).

R0: Materials which are normally stable even under fire exposure conditions and which are not reactive with water (see NFPA for details).

\*OTHER TOXICITY DATA:

Skin and Eye Irritation Data:

eye-rat 12 mg/m3/3D

eye-rbt 100 mg/1H MLD

eye-rbt 1440 mg/6H MOD

skn-rbt 555 mg open MLD

eye-rbt 12 mg/m3/3D

eye-rbt 500 mg/24H MLD

Review: Toxicology Review

Status: EPA TSCA Chemical Inventory, 1986

NIOSH Analytical Methods: see Ethylene Glycol, 5500

EPA Genetox Program 1988, Negative: Cell transform.-SA7/SHE; N crassa-aneploidy

EPA Genetox Program 1988, Negative: Histidine reversion-Ames test

EPA Genetox Program 1988, Inconclusive: D melanogaster-whole sex chrom. loss

EPA Genetox Program 1988, Inconclusive: D melanogaster-nondisjunction

EPA TSCA Section 8(e) Status Report 8EHQ-0485-0552

EPA TSCA Test Submission (TSCATS) Data Base, January 1990

Human lethal dose: 1.4 mL/kg or 100 mL [033,043,051,430]

-OTHER DATA (Regulatory)

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\*PROPER SHIPPING NAME (IATA): Other regulated substances

\*UN/ID NUMBER: ID8027

\*HAZARD CLASS: 9

SUBSIDIARY RISK: None

PACKING GROUP: None

\*LABELS REQUIRED: Miscellaneous

\*PACKAGING: PASSENGER: PKG. INSTR.: 906

MAXIMUM QUANTITY: No limit

CARGO : PKG. INSTR.: 906

MAXIMUM QUANTITY: No limit

\*SPECIAL PROVISIONS: None

\*USES:

This compound is used in antifreeze, in hydraulic brake fluids, as an industrial humectant, as an ingredient of electrolytic condensers, as a solvent

in the paint and plastics industries, in the formulation of printers inks, stamp pad inks and ball point pen inks, as a softening agent for cellophane and as a stabilizer for soybean foam used to extinguish oil and gasoline fires. It is used in the synthesis of safety explosives, glyoxal, unsaturated ester-type alkyd resins, plasticizers, elastomers, synthetic fibers and synthetic waxes. It is also used in asphalt emulsion, as a heat transfer agent and as an ingredient for deicing airport runways.

\*COMMENTS: Not available

-HANDLING PROCEDURES

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\*ACUTE/CHRONIC HAZARDS:

This compound is toxic by ingestion [033]. It may be readily absorbed through the skin [058,269]. When heated to decomposition it emits acrid smoke, irritating fumes and toxic fumes of carbon monoxide, carbon dioxide and unidentified organic compounds [043,058].

\*MINIMUM PROTECTIVE CLOTHING: Not available

\*RECOMMENDED GLOVE MATERIALS:

GlovES+ Expert System Glove Types For The Neat (Undiluted) Chemical:

This chemical has not been tested for permeation by Radian Corporation; however, the GlovES+ expert system was used to extrapolate permeation test information from compounds in the same chemical class. The GlovES+ system uses permeation data from literature sources; therefore, extra safety margins should be used with the estimated protection time(s). If this chemical makes direct contact with your glove, or if a tear, puncture or hole develops, replace them at once.

The GlovES+ expert system is a tool that can help people better manage protection from chemicals, however this tool cannot replace sound judgment nor make technical decisions. Our GlovES+ expert system is designed to offer initial advice and assistance in glove selection while the final glove selection should be made by knowledgeable individuals based on the specific circumstances involved.

Glove Type	Model Number	Thickness	Estimated Protection Time
PVC	Pioneer V-20	0.51 mm	480 min
Nitrile	Comasec Comatril	0.55 mm	480 min
Neoprene	Edmont-Neox	0.38 mm	480 min
Natural rubber	Edmont 36-124	0.46 mm	360 min

\*RECOMMENDED RESPIRATOR:

Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with an organic vapor/acid gas cartridge (specific for organic vapors, HCl, acid gas and SO2) with a dust/mist filter.

\*OTHER: Not available

\*STORAGE PRECAUTIONS:

You should store this material at ambient temperatures and protect it from moisture and oxidizers. If possible, it would be prudent to store this compound under inert atmosphere.

\*SPILLS AND LEAKAGE:

If you should spill this chemical, use absorbent paper to pick up all liquid spill material. Seal the absorbent paper, as well as any



of your clothing which may be contaminated, in a vapor-tight plastic bag for eventual disposal. Wash any surfaces you may have contaminated with a soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

\*DISPOSAL AND WASTE TREATMENT: Not available

-EMERGENCY PROCEDURES

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\*SKIN CONTACT:

IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.

If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.

\*INHALATION:

IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital.

Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

\*EYE CONTACT:

First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.

Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.

IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

\*INGESTION:

DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.

If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

\*SYMPTOMS:

Symptoms of exposure to this compound include restlessness, unsteady gait, drowsiness, coma, transient stimulation of central nervous system followed by depression, vomiting, renal damage, anuria and uremia [036]. Other symptoms include lacrimation, general anesthesia, headache, cough, respiratory stimulation, nausea and pulmonary and liver damage [043]. It may cause congestion, edema and damage to the brain, acidosis, focal hemorrhagic necrosis of the renal cortex, hydropic degeneration of the liver and kidneys, calcium oxalate crystals in the brain, spinal cord and kidneys; narcosis, cyanosis, tachypnea, pulmonary edema, muscle tenderness, stupor, prostration, unconsciousness with convulsions, hypoglycemia, death from respiratory failure, hypocalcemic tetany, intravascular hemolysis, oliguria,

nystagmus, lymphocytosis, reduced blood pH or glucose, methemoglobinemia and hyperkalemia [301]. It may also cause low-grade fever, depressed reflexes, generalized or focal seizures, tetanic contractions, myoclonic jerks, ophthalmoplegia, papilledema, optic atrophy, tachycardia, mild hypotension, bronchopneumonia, cardiac enlargement and congestive failure [430]. Exposure may lead to anorexia, hematopoietic dysfunction and depression followed by respiratory and cardiac failure [346]. It may also lead to blood or central nervous system damage, eye irritation, dizziness, abdominal pain and discomfort, malaise, lumbar pain, loss of appetite and neural dysfunction [058].

-SOURCES

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\*SOURCES:

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Last revised: 13 August 2001

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## NTP CHEMICAL REPOSITORY

## ETHYLENE GLYCOL MONOBUTYL ETHER

## -IDENTIFIERS

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\*CATALOG ID NUMBER: 001767

\*CAS NUMBER: 111-76-2

\*BASE CHEMICAL NAME: ETHYLENEGLYCOLMONOBUTYLETHER

\*PRIMARY NAME: ETHYLENE GLYCOL MONOBUTYL ETHER

\*CHEMICAL FORMULA: C6H14O2

\*STRUCTURAL FORMULA: CH3(CH2)3OCH2CH2OH

\*WLN: Q204

## \*SYNONYMS:

BUCS

BUTOXYETHANOL

N-BUTOXYETHANOL

2-BUTOXYETHANOL

2-BUTOXY-1-ETHANOL

BUTYL CELLOSOLVE

O-BUTYL ETHYLENE GLYCOL

BUTYL GLYCOL

BUTYL OXITOL

DOWANOL EB

EKTASOLVE EB

ETHYLENE GLYCOL N-BUTYL

GAPCOL EB

GLYCOL BUTYL ETHER

GLYCOL ETHER EB

GLYCOL ETHER EB ACETATE

GLYCOL MONOBUTYL ETHER

JEFFERSOL EB

MONOBUTYL ETHER OF ETHYLENE GLYCOL

MONOBUTYL GLYCOL ETHER

3-OXA-1-HEPTANOL

POLY-SOLV EB

UN 2369

## -PHYSICAL CHEMICAL DATA

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\*PHYSICAL DESCRIPTION: LITERATURE: Clear, colorless, mobile liquid  
REPOSITORY: Clear, colorless liquid

\*MOLECULAR WEIGHT: 118.18

\*SPECIFIC GRAVITY: 0.9012 @ 20/20 C

\*DENSITY: Not available

\*MP (DEG C): -70 C

\*BP (DEG C): 171 C @ 743 mm Hg

\*SOLUBILITIES:

WATER : >=100 mg/mL @ 22 C (RAD)

DMSO : >=100 mg/mL @ 22 C (RAD)

95% ETHANOL : >=100 mg/mL @ 22 C (RAD)

METHANOL : Not available

ACETONE : >=100 mg/mL @ 22 C (RAD)

TOLUENE : Not available

OTHER SOLVENTS:

Most organic solvents: Soluble

Mineral oil: Soluble

Ether: Soluble

\*VOLATILITY:

Vapor pressure: 0.76 mm Hg @ 20 C; 0.88 mm Hg @ 25 C; 300 mm Hg @ 140 C

Vapor density : 4.07

\*FLAMMABILITY (FLASH POINT):

This chemical has a flash point of 60 C (141 F). It is combustible.

Fires involving this material can be controlled with a dry chemical, carbon dioxide or Halon extinguisher. The autoignition temperature for this chemical is 244 C (472 F).

\*UEL: 10.6%

LEL: 1.1%

\*REACTIVITY:

This compound may react with bases, aluminum and oxidizing materials. It is liable to form peroxides on exposure to air and light. It attacks some forms of plastics, rubber and coatings.

\*STABILITY:

This chemical is sensitive to air and light. Solutions of this chemical in water, DMSO, 95% ethanol or acetone should be stable for 24 hours under normal lab conditions (RAD).

\*OTHER PHYSICAL DATA:

Specific gravity: 0.9015 @ 20/4 C

Boiling point: 50 C @ 4 mm Hg

Pleasant odor; sour taste

Oily liquid

Refractive index: 1.4198 @ 20 C

Weight/gallon: 7.51 lb @ 20 C

Evaporation rate: 0.1

-TOXICITY

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\*NIOSH REGISTRY NUMBER: KJ8575000

\*TOXICITY: (abbreviations)

typ.	dose	mode	specie	amount	units	other
------	------	------	--------	--------	-------	-------

TCLo	ihl	hmn	195	ppm/8H
LD50	orl	rat	1480	mg/kg
LC50	ihl	rat	450	ppm/4H
LD50	ipr	rat	220	mg/kg
LD50	ivn	rat	340	mg/kg
LD50	orl	mus	1230	mg/kg
LC50	ihl	mus	700	ppm/7H
LD50	ipr	mus	536	mg/kg
LDLo	scu	mus	500	mg/kg
LD50	ivn	mus	1130	mg/kg
LD50	orl	rbt	320	mg/kg
LD50	skn	rbt	490	mg/kg
LD50	ivn	rbt	280	mg/kg
LD50	orl	gpg	1200	mg/kg
LD50	skn	gpg	230	mg/kg
LD50	ipr	rbt	220	mg/kg

\*AQTX/TLM96: 1000-100 ppm

\*SAX TOXICITY EVALUATION:

THR = HIGH human irritant via inhalation. HIGH via intravenous, oral and dermal routes. MODERATE via oral, intraperitoneal, inhalation, subcutaneous and dermal routes. MILD skin and eye irritant.

\*CARCINOGENICITY: Not available

\*MUTATION DATA:

test	lowest dose	test	lowest dose
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Not available			

\*TERATOGENICITY:

Reproductive Effects Data:

TCLo: ihl-rat	200 ppm/6H (6-15D preg)
TCLo: ihl-rat	25 ppm/6H (6-15D preg)
TDLo: orl-mus	9440 mg/kg (7-14D preg)
TCLo: ihl-rbt	200 ppm/6H (6-18D preg)
TCLo: ihl-rbt	100 ppm/6H (6-18D preg)

\*STANDARDS, REGULATIONS & RECOMMENDATIONS:

OSHA: Federal Register (1/19/89) and 29 CFR 1910.1000 Subpart Z  
 Transitional Limit: PEL-TWA 50 ppm (skin) [610]  
 Final Limit: PEL-TWA 25 ppm (skin) [610]

ACGIH: TLV-TWA 25 ppm (skin) [610]

NIOSH Criteria Document: None

NFPA Hazard Rating: Health (H): 2

Flammability (F): 2

Reactivity (R): 0

H2: Materials hazardous to health, but areas may be entered freely with full-faced mask self-contained breathing apparatus which provides eye protection (see NFPA for details).

F2: Materials which must be moderately heated before ignition will occur (see NFPA for details).

R0: Materials which are normally stable even under fire exposure conditions and which are not reactive with water (see NFPA for details).

\*OTHER TOXICITY DATA:

Skin and Eye Irritation Data:

skn-rbt	500 mg open MLD
eye-rbt	18 mg

Standards and Regulations: DOT-IMO: Poison B; Label: St. Andrew's Cross,  
Flammable liquid  
Status: "NIOSH Manual of Analytical Methods, 3rd. Ed."  
Reported in EPA TSCA Inventory, 1983  
EPA TSCA Section 8(e) Status Report 8EHQ-0483-0475  
Meets criteria for proposed OSHA Medical Records Rule

-OTHER DATA (Regulatory)

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\*PROPER SHIPPING NAME (IATA): Ethylene glycol monobutyl ether

\*UN/ID NUMBER: UN2369

\*HAZARD CLASS: 6.1                      SUBSIDIARY RISK: None                      PACKING GROUP: III

\*LABELS REQUIRED: Keep away from food

\*PACKAGING: PASSENGER: PKG. INSTR.: 611, Y611                      MAXIMUM QUANTITY: 60 L, 2 L  
CARGO : PKG. INSTR.: 618                      MAXIMUM QUANTITY: 220 L

\*SPECIAL PROVISIONS: None

\*USES:

Solvent for nitrocellulose, resins, grease, oil and albumin; dry cleaning;  
spray lacquers; quick-drying lacquers; varnishes; enamels; varnish removers;  
textiles (preventing spotting in printing or dyeing); emulsifier for  
petroleum.

\*COMMENT:

Reviewed by: RLT/860723; RAS/860804

-HANDLING PROCEDURES

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\*ACUTE/CHRONIC HAZARDS:

When heated to decomposition this compound emits acrid smoke and irritating  
fumes. It is toxic by skin absorption and may be narcotic if ingested. It  
may cause irritation to the eyes and respiratory tract.

\*MINIMUM PROTECTIVE CLOTHING: Not available

\*RECOMMENDED GLOVE MATERIALS:

GloVES+ Expert System Glove Types For The Neat (Undiluted) Chemical:

This chemical has not been tested for permeation by Radian Corporation;  
however, the GloVES+ expert system was used to extrapolate permeation test  
information from compounds in the same chemical class. The GloVES+ system uses  
permeation data from literature sources; therefore, extra safety margins should  
be used with the estimated protection time(s). If this chemical makes direct  
contact with your glove, or if a tear, puncture or hole develops, replace them  
at once.

The GloVES+ expert system is a tool that can help people better manage  
protection from chemicals, however this tool cannot replace sound judgment nor  
make technical decisions. Our GloVES+ expert system is designed to offer  
initial advice and assistance in glove selection while the final glove  
selection should be made by knowledgeable individuals based on the specific  
circumstances involved.



Glove Type	Model Number	Thickness	Estimated Protection Time
Butyl rubber	North B-161	0.40 mm	480 min
Nitrile	Edmont 37-175	0.38 mm	480 min
Viton	North F-091	0.30 mm	380 min
PE/EVAL/PE	Safety4 4H	0.07 mm	240 min

\*RECOMMENDED RESPIRATOR:

Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with an organic vapor/acid gas cartridge (specific for organic vapors, HCl, acid gas and SO<sub>2</sub>) with a dust/mist filter.

\*OTHER: Not available

\*STORAGE PRECAUTIONS:

You should protect this chemical from exposure to light. Keep the container tightly closed under an inert atmosphere, and store under refrigerated temperatures. STORE AWAY FROM SOURCES OF IGNITION.

\*SPILLS AND LEAKAGE:

If you spill this chemical, FIRST REMOVE ALL SOURCES OF IGNITION. Then, use absorbent paper to pick up all liquid spill material. Seal the absorbent paper, as well as any of your clothing which may be contaminated, in a vapor-tight plastic bag for eventual disposal. Wash any surfaces you may have contaminated with a soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

\*DISPOSAL AND WASTE TREATMENT:

Not available

-EMERGENCY PROCEDURES

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\*SKIN CONTACT:

IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.

If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.

\*INHALATION:

IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital.

Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

\*EYE CONTACT:

First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.

Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.

IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

**\*INGESTION:**

DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.

If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

**\*SYMPTOMS:**

Symptoms of exposure to this compound may include irritation of the eyes and respiratory tract; headache, hepatic hemoglobinemia, albuminuria, nausea, vomiting, dizziness, drowsiness, unconsciousness, central nervous system effects, narcotic effects, bone marrow damage, kidney and liver damage; dark red urine and hemolysis.

**-SOURCES**

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